SPECIFICATION

POWER CONTROL APPARATUS FOR HINGE DEVICE

1. FIELD OF THE INVENTION

[0001] The present invention relates to a power control apparatuses, and particularly to a power control apparatus which is used in a hinge device to save electronic resource.

2. RELATED ART

[0002] A portable electronic device such as notebook computer is easy to carry and can be freely used anywhere, even in places where no commercial power supply is available, by using a battery pack incorporated in the computer. However, the capacity of the battery is limited. In most situations, the display of the computer is powered on when the computer system itself is operating, and the display is powered off when the computer system is switched off. During waiting time or stand-by time, the display continues to consume the limited power of the battery. Not only does the battery have limited capacity, but it is also limited in size because of the need for the computer case to be compact and portable. This makes conservation of the battery an important yew problematic issue.

[0003] Certain devices have been developed to solve the above mentioned problem. For example, China Patent Application No. 99123856.7 discloses a power saving circuit and method applied in a liquid crystal display (LCD) device. In this patent, the power circuit automatically shuts off power to the LCD display after a predetermined idle time has elapsed. However, the power circuit is complicated and increases the cost of the LCD device. In addition, the control method does not accurately control the power consumed by the LCD display.

[0004] Recently, suspend switches have been used in notebook computers to control the powering on and off of the displays. Most of these suspend switches

are equipped outside the computer. This tends to detrimentally obviously affect the aesthetic appearance of the computer, and exposes the suspend switch to contamination and accidental damage.

[0005] An improved suspend switch which solves the above-described problems is desired.

SUMMARY OF THE INVENTION

[0006] Accordingly, a main object of the present invention is to provide a power control apparatus for use with a hinge device of electronic equipment, in which the power control apparatus has a simple structure and efficiently and safely controls power consumption of the electronic equipment.

[0007] To achieve the above object, a power control apparatus of the present invention includes a bearing seat secured in a mainframe of an electronic device, a rotating portion secured in a display of the electronic device, and a loading board attached to the bearing seat. The bearing seat includes a shaft. The rotating portion includes a sleeve pivotally receiving the shaft of the bearing seat. The sleeve has an actuator extending from an end thereof. The loading board includes a suspend switch with an elastic button thereon. The rotating portion is rotatable between a first portion in which the button protrudes from the switch, and a second position in which the button is depressed into the switch by the actuator so that the mainframe terminates signals and power delivery to the display.

[0008] Other objects, advantages and novel features of the present invention will be drawn from the following detailed description of preferred embodiments of the present invention with the attached drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Fig. 1 is an isometric view of a power control apparatus in accordance with the present invention installed in a notebook computer, the power control

apparatus comprising an actuator, a suspend switch and a button;

[0010] Fig. 2 is an enlarged view of part of the power control apparatus of Fig. 1, but viewed from a slightly different aspect;

[0011] Fig. 3 is an explored, isometric view of the power control apparatus in accordance with the present invention;

[0012] Fig. 4 is a schematic, side elevation cross sectional view of Fig. 1, showing the actuator a distance from the button of the suspended switch;

[0013] Fig. 5 is similar to Fig. 4, but showing the actuator beginning to contact the button; and

[0014] Fig. 6 is similar to Fig. 5, but showing the actuator completely depressing the button into the suspend switch.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Referring to Figs. 1 to 6, a power control apparatus in accordance with the present invention is adapted to be used in a notebook computer. The power control apparatus can also be applied in any other electronic device which utilizes a hinge device therein. The power control apparatus comprises a hinge device 10, a loading board 20 and a suspend switch 30. The hinge device 10 is used to pivotally couple a display 40 to a mainframe 50 of the notebook computer. The display 40 may be a LCD display, or similar output display. The loading board 20 is fixed in the hinge device 10. The suspend switch 30 is attached to the loading board 20, and control power on/off of a power supply to the display 40. When the display 40 is rotated relatively to the mainframe 50, this triggers the suspend switch 30 at a predetermined position.

[0016] Referring particularly to Fig. 3, the hinge device 10 comprises a bearing seat 12 and a rotating portion 14. The bearing seat 12 is fixedly attached to the

mainframe 50 of the notebook computer. The bearing seat 12 comprises a base 124, a shaft 122, and a neck portion 128. The neck portion 128 extends upwardly from the base 124. The shaft 122 extends horizontally from an upper end of the neck portion 128. That is, the neck portion 128 interconnects the base 124 and the shaft 122. The base 124 defines securing holes 121, 123, 126 and 125 therein. The rotating portion 14 comprises a sleeve 142 for pivotally receiving the shaft 122 of bearing seat 12. The sleeve 142 defines a longitudinal slit 141 therein. An elongate actuator 144 extends coplanarly from an end of the sleeve 142. A longitudinal connecting board 146 extends upwardly from a periphery of the sleeve 142 adjacent the slit 141. The connecting board 146 defines a pair of connecting holes 148 therein.

[0017] The loading board 20 is attached to the bearing seat 12. The suspend switch 30 is fixed on the loading board 20. The suspend switch 30 comprises a movable elastic button 34. The button 34 is adapted to be depressed into the suspended switch 30, and to bound to an original position in which it protrudes out from the suspend switch 30. When the button 34 is depressed into the suspend switch 30, it breaks a control circuit in the notebook computer so that the power supply to the display 40 is cut off. The position of the button 34 determines whether the suspend switch 30 is in a power on or a power off position. In the off position, the button 34 is depressed into the suspend switch 30, and the notebook computer's operating system terminates signals and power delivery to the display 40. Conversely, in the on position, the button 34 protrudes out from the suspend switch 30, and the notebook computer operating system delivers signals and power to the display 40. The loading board 20 defines a cutout 22 and a securing hole 24 therein.

[0018] In assembly, the loading board 20 is attached to the bearing seat 12. An intermediate part of the neck portion 128 of the bearing seat 12 is engagingly received in the cutout 22 of the loading board 20. A fastener is extended through

securing hole 24 of the loading board 20 to engage in the securing hole 126 of the seat 124 of the bearing seat 12. The rotating portion 14 is pivotally coupled to the bearing seat 12. The shaft 122 of the bearing seat 12 is inserted into the sleeve 142 of the rotating portion 14. The actuator 144 can rotationally contact the button 34 of the suspend switch 30. Fasteners (not shown) are extended through the connecting hole 148 of the connecting board 146 to secure the rotating portion 14 to the display 40. Fasteners are extended through the securing hole 121, 123, 125 of the base 124 of the bearing seat 12 to secure the bearing seat 12 to the mainframe 50.

[0019] Referring to Figs. 4, 5 and 6, in operation, the display 40 can be rotated from an open position through intermediate positions to a close position along in a direction indicated by arrow A. In the open position, the actuator 144 is far away from the button 34, and the button 34 is in a released state protruding out from the suspend switch 30. When the display 40 is rotated in direction A, the actuator 144 comes into contact with and gradually depressed the button 34 into the suspend switch 30. When the button 34 is completely depressed into the suspend switch 30, the button 34 is in the off position, and the notebook computer operating system terminates signals and power delivery to the display 40.

[0020] When the display 40 is rotated back in a direction opposite to direction A, the actuator 144 rotates from and gradually releases the button 34. When the actuator 144 completely separates from the button 34, the button 34 returns to its original position protruding out from the suspend switch 30. The button 34 is in the on position, and the notebook computer operating system delivers signals and power to the display 40.

[0021] It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail,

especially in matters of shape, size, and arrangement of parts within the principles of the invention to full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.